RESTRICTED

MED. SEC. GHQ. FEC.

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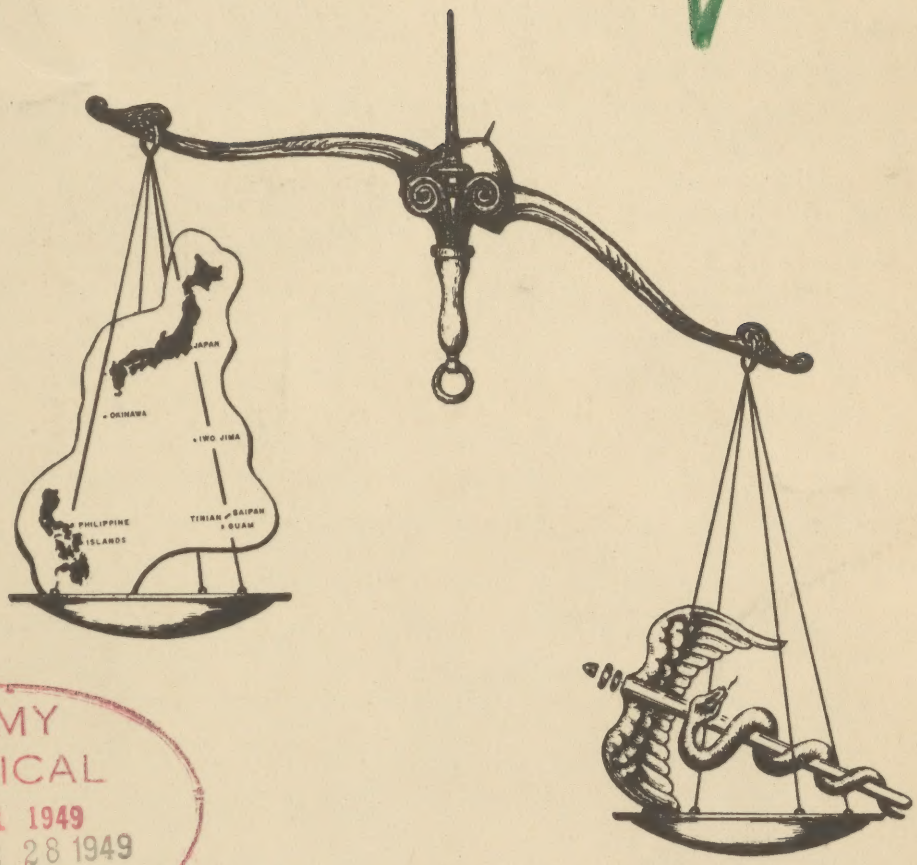


A FAR EAST PERIODICAL OF MEDICAL DEPARTMENT INFORMATION

SURGEON'S CIRCULAR LETTER

RESTRICTED

MOS's AND TITLES THEREOF PERTAINING TO THE MEDICAL DEPARTMENT

(Ref TM 12-406 and TM 12-425 A)

2110 Adjutant or Adjutant General (MSC)
2120 Administrative Officer (MSC)

2200 Military Personnel Officer (MSC
2201 Personnel Assignment Officer (MSC)
2205 Director of Personnel (MSC)
2210 Classification & Assignment Officer (MSC)
2231 Research Psychologist (MSC)
2232 Clinical Psychologist (MSC)
2239 Psychological Assistant (MSC)

2431 Medical Registrar (MSC)
2520 Training Officer (MSC)

2616 Plans and Policies Officer (MSC)

2700 Student Officer (All Branches)

3000 Medical Officer, Staff (MC)
3005 Medical Officer, Preventive Medicine (MC)
3006 Medical Officer, Industrial Medicine (MC)
3007 Malariologist (MC)
3012 Hospital Administrator (MSC)
3020 Vital Statistics Officer (MSC)

3100 Medical Officer, General (MC)
3101 Medical Officer, Tuberculosis (MC)
3104 Proctologist (MC)
3105 Gastro-Enterologist (MC)
3106 Ophthalmologist and Otorhinolaryngologist (MC)
3107 Cardiologist (MC)
3108 Obstetrician and Gynecologist (MC)
3111 Urologist (MC)
3112 Dermatologist (MC)
3113 Allergist (MC)
3115 Anaesthesiologist (MC)
3116 Pediatrician (MC)
3125 Ophthalmologist (MC)
3126 Otorhinolaryngologist (MC)
3127 Electroencephalographer (MC)
3128 Neurologist (MC)
3129 Psychiatrist (MC)
3130 Neuropsychiatrist (MC)
3131 Neurosurgeon (MC)
3138 Medical Officer, Tropical Medicine (MC)
3139 Internist (MC)
3150 General Surgeon (MC)
3151 Thoracic Surgeon (MC)
3152 Plastic Surgeon (MC)
3153 Orthopedic Surgeon (MC)
3170 Dental Officer (DC)
3171 Oral Surgeon, Dental (DC)
3172 Exodontist (DC)
3173 Orthodontist (DC)
3174 Periodontist (DC)
3175 Prosthodontist (DC)
3178 Dental Officer, Staff (DC)
3180 Physical Medicine Officer (MC)
3182 Diagnostic & Therapeutic Radiologist (MC)
3184 Diagnostic Radiologist (MC)

3200 Veterinary Officer, General (VC)
3201 Veterinary Officer, Large Animal (VC)
3202 Veterinary Officer, Small Animal (VC)
3203 Veterinary Officer, Staff (VC)
3205 Veterinary Officer, Remount (VC)
3221 Meat and Dairy Products Inspector (VC)
3222 Meat Products Inspector (VC)
3223 Dairy Products Inspector (VC)
3231 Veterinary Officer, Laboratory (VC)

3303 Medical Officer, Laboratory (MC)
3306 Radiologist (MC)
3307 Bacteriologist (MSC)
3309 Biochemist (MSC)
3310 Parasitologist (MSC)
3311 Serologist (MSC)
3314 Clinical Laboratory Officer (MSC)
3315 Entomologist (MSC)
3316 Nutrition Officer (MSC)
3318 Pharmacy Officer (MSC)
3325 Tissue Pathologist (MC)
3327 Aviation Physiologist (MC)
3340 Optometry Officer (MSC)

3416 Occupational Therapist (WMSC)
3418 Physical Therapist (WMSC)
3420 Hospital Dietitian (WMSC)
3430 Nurse, Administrative (ANC)
3437 Nurse, Neuropsychiatric (ANC)
3441 Nurse, Communicable Disease (ANC)
3442 Nurse, Pediatric (ANC)
3443 Nurse, Operating Room (ANC)
3445 Nurse, Anesthetist (ANC)
3446 Nurse, Obstetrical (ANC)
3449 Nurse, General Duty (ANC)

3500 Medical Officer, Command (MC)
3503 Ambulance Officer (MSC)
3504 Litter Officer (MSC)
3506 Medical Assistant (MSC)

3605 Psychiatric Social Worker (MSC)

4000 Supply Officer, General (MSC)
4012 Director of Supply (MSC)

4110 Mess Officer (MSC)

4490 Medical Supply Officer (MSC)

4890 Medical Equipment Maintenance Officer (MSC)
4891 Optician (MSC)

5004 Information-Education Officer (MSC)

5310 Chaplain

5521 Physical Training Officer (MSC)
5525 Physical Reconditioning Officer (MSC)

7316 Toxicologist (MSC)

7960 Sanitary Engineer (MSC)

8547 Medical Photographer (MSC)

GENERAL HEADQUARTERS
FAR EAST COMMAND
MEDICAL SECTION

SURGEON'S CIRCULAR LETTER APO 500

NO. . . . . .11 1 November 1949

PART I

ADMINISTRATIVE

I. Organization of the Medical Section

Departure from the Medical Section, General Headquarters, Far East Command: 1st Lt. M. F. Watson, MSC, completed his overseas tour of duty and returned to the zone of interior for reassignment.

WOJG A. H. McIntire completed his overseas tour of duty and returned to the zone of interior for reassignment.

II. Senior Dental Student Program Continued

The Army Senior Dental Student Program which was originated last year has been approved for extension for one year by the Department of the Army. This program will provide an opportunity for 300 dental students who will complete their dental education in 1950 to be commissioned in the Army as second lieutenants in the Medical Service Corps Reserve and be ordered to extended active duty, at the schools in which they are enrolled, on full pay and allowances of that grade during their senior year. On graduation, these officers will be commissioned first lieutenants in the Dental Corps Reserve. They will serve on extended active duty as dental officers for two years.

Three important changes have been made in the newly-extended program. Application for the Regular Army will not be a requirement; ROTC dental students may participate in the program, and the maximum age limit has been raised to 35 years.

III. Natives Trained for Medical Duties

The Navy, in an effort to raise the health standards of approximately 50,000 natives living in the Pacific Trust Territory established a School of Medical Assistants to educate natives in medical work. Five native men were recently graduated from this school, having completed a four-year curriculum and are now considered qualified for general medical practice, including minor surgery. The graduates, three from American Samoa, one from Guam and one from Majuro Atoll have returned to their home islands to enter medical practice.

The Medical Assistants School is one of three such schools which the Navy has established on Guam. There also is a School of Dental Assistants, with a four-year curriculum, and a School of Nurses, which offers a three-year course.

IV. Aureomycin and Chloromycetin

The following information contained in a Department of the Army letter, subject: Aureomycin and Chloromycetin, dated 27 September 1949, is published for the guidance of all personnel concerned:

"1. It is contemplated that in the near future the subject drugs will be listed in the Armed Services Catalog of Medical Materiel as standard items of issue and under appropriate nomenclature and stock numbers. The inclusion of these drugs as standard items of issue may result in a large amount being requisitioned, amounts which may not be available for issue. It is desired to point out that Aureomycin* and Chloromycetin** are still in the category of scarce and costly drugs. Clinical investigations obtained to date indicate that these drugs will have a definite place in the treatment of many cases coming to the attention of attending physicians in military hospitals, particularly in out-patient clinics. Since treatment with these drugs can be accomplished by oral administration, a trend may develop in favor of this form of administration.

"2. The Surgeon General will endeavor to make Aureomycin and Chloromycetin available in quantities sufficient to meet the needs of the service. It is desired to point out, however, that Penicillin and Streptomycin in several forms are available under appropriate stock numbers in the Armed Services Catalog of Medical Materiel and are as effective as Aureomycin and Chloromycetin in the treatment of many conditions. The former drugs should be used whenever possible in order to conserve the small supply of Aureomycin and Chloromycetin, and to stay within budget limitations."

* 1-596-575 Aureomycin Hydrochloride Capsules, 0.25 Gm. (4 Gr.), 100s:
** 1-600-495 Chloromycetin Capsules, 0.25 Gm. (4 Gr.), 100s: (Pending Standardization)

V. Army Nurse Assigned to Isotope Research

A team of four scientific specialists at the Army Medical Center, Washington, D.C., includes the first Army nurse to be assigned to isotope research.

First Lieutenant Margaret E. Peters, ANC (Res.), has joined three male officers who are exploring new possibilities in the use of radioactive substances for the diagnosis and treatment of disease. The team is assigned to the Department of Radiobiology in the Medical Department Research and Graduate School of the Center.

Lt. Peters is to be instructed in the handling of radioactive substances and the development of techniques and procedures which may be used by nurses ordered to similar duty. It is believed that her pioneer experience will open an entirely new area of medical activity for the Army Nurse Corps.

Physicians on the research team are Capts. Robert J. Soberman and Richard P. Keating. A chemist, Lt. Col. Roy E. Maxwell, is the fourth member of the group.

VI. Food Handlers Inspection

A thorough inspection of the hands of food handlers will often reveal collections of material in the creases of hands, around and in cuts and broken blisters, and especially under the nails.

Several important diseases can readily be spread by deposits of organisms in the above-mentioned places. It is an extremely simple matter to transport pathogenic bacteria, cysts and eggs from the anus to the food and cause infection of a person or persons.

Often the food handlers are supplied with adequate hand-washing facilities, brushes and soap, but even more often the food handlers have not received adequate instructions in hand washing. Every food handler should have thorough instruction as to proper cleansing of the hands, followed by repeated inspections of the hands to determine further need of instruction.

Before handling food or utensils and after using the latrine, the hands should be washed thoroughly with hot water and soap. An added safeguard is the use of a hand brush in all creases, between the fingers and under the finger nails. A stick or nail file should be available for cleaning under the finger nails and all food handlers should be required to have their nails cut short.

VII. Recent Department of the Army and FEC Publications

AR 615-250, 20 Sep 49 - Enlisted Personnel - Physical Inspections. Supersedes AR 615-250, 24 Jul 42; Par. 8, AR 40-100, 8 Apr 46; So much of Par. 4, AR 40-225, 24 Jul 47 as pertains; Sec I, WD Cir 186, 47

DA CIR 95, 19 Aug 49 - I. Army-Navy Catalog of Medical Materiel, Spare Parts Sect - Effective Date of Pamphlets. II. Recission - ASF Supply Catalog

DA CIR 97, 1 Sep 49 - Sec II. Clinical Record Forms

SR 40-406-5, 15 Aug 49 - Medical Service: Permanent File of Medical Literature

SR 350-90-1, 16 Aug 49 - U.S.Military Academy Preparatory Training. Par. 5 Preliminary Physical Examination

SR 605-60-45, 2 Sep 49 - Officers Medical Service Corps Allied Scientist Procurement - Graduate Social Student Program

SR 600-145-11, 9 Sep 49 - Personnel - Assignment of Hospital Patients. Supersedes SR 600-145-11, 2 Mar 49

T/O&E 8-510, 21 Jul 49 - Field Hospital

T/O&E 8-590, 22 Jul 49 - Convalescent Center, Army. Supersedes T/O&E 8-590, 1 Apr 42 and Changes

T/A 10-100-12, 5 Aug 49 - Allowances of Insect and Rodent Control Supplies. Supersedes WD Memo 40-205-2, 13 Dec 46

GHQ SCAP CIR 22, 13 Sep 49 - Private Commercial Entrants. Sec III, e. (3) Vaccinations; Sec VII, c and f. Immunization and Emergency Medical Treatment

GHQ SCAP CIR 23, 13 Sep 49 - General Personnel Regulations: Par 14. "Off Limits" Areas. (2) Japanese Hospitals (3) Beaches, Pools, etc. Par 15. Civilian Food Supplies. Par 16. Illegal Commercial Activities. SubPar (1) (a) Narcotic Drugs

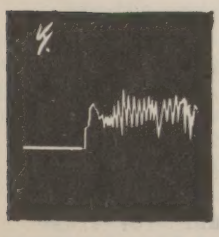
GHQ SCAP CIR 25, 20 Sep 49 - Consumption of Japanese Food Products. Inclosure 1 to Cir 20, GHQ SCAP, 6 Sep 49 is amended

GHQ FEC CIR 51, 24 Sep 49 - Marriage of Military and Civilian Personnel. Par 6 c (11) Physical Examination. This circular supersedes GHQ FEC Cir 86, 13 Aug 47

PART II

TECHNICAL

VIII. Use of Dicumarol - Col. R. E. Blount, MC, Medical Consultant, FEC, and Lt. Col. W. D. Tigertt, MC, 406th Med Gen Lab, Tokyo, Japan



Dicumarol has been accepted as a valuable therapeutic agent in the treatment of coronary thrombosis and in the prevention and treatment of thrombophlebitis and thromboembolic phenomena. However, as is true of many potent drugs, the use of dicumarol carries a definite risk. At least 23 deaths have been reported, generally as a result of hemorrhagic diatheses. The drug should not be used in patients showing significant hepatic or renal insufficiency, ulcerative lesions of the gastrointestinal tract, purpura, thrombocytopenia, sub-acute bacterial endocarditis, after operations on brain or spinal cord, and during pregnancy near term. It should be used cautiously if at all when: there is an active peptic ulcer; there are open granulating wounds; drainage tubes are used in wounds or body orifices; there are severe vitamin deficiencies.

IT IS ESSENTIAL THAT THE DOSAGE OF DICUMAROL BE CONTROLLED BY ACCURATE DETERMINATIONS OF THE PROTHROMBIN TIME. The recommended method of determining prothrombin time is that of Quick. In this determination oxalated plasma is mixed with an equal amount of thromboplastin solution. To this mixture is added a small quantity of calcium chloride, the tube shaken, and the exact time in seconds required for the formation of a firm semi-solid clot is taken as the "prothrombin time." Details are given in Paragraph 79 a of TM 8-227 (October 1946) "Methods for Laboratory Technicians." Commercially prepared thromboplastin is available as a controlled non-standard supply item.

Articles dealing with the control of dicumarol therapy are frequently indefinite as to the calculation of the altered prothrombin level of prothrombin activity. A method frequently used is to divide the prothrombin time of a normal plasma by the prothrombin time of the "abnormal" or patient's plasma and then expressing the results as prothrombin percent. Such a procedure is entirely erroneous and treacherous and must be avoided.

To guide the administration of dicumarol four different control times should be obtained.[1] These various times must be obtained on each batch of thromboplastin since wide variations in potency may be encountered. These control factors are:

1. The average prothrombin time in seconds using normal undiluted oxalated plasma (termed T-100).
2. The average prothrombin time in seconds for normal plasma diluted to a 30% concentration in 0.9% saline prior to testing (3 parts of normal plasma plus 7 parts of 0.9% saline) (termed T-30).
3. The average prothrombin time in seconds of similarly prepared 20% normal plasma in 0.9% saline (termed T-20).
4. The average prothrombin time in seconds of similarly prepared 10% normal plasma in 0.9% saline (termed T-10).

In general the dosage of dicumarol should be regulated so that the prothrombin time of the patient is kept between that of T-30 and T-10. A suggested dosage schedule is as follows:

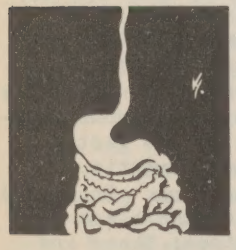
1. Give entire day's dose by mouth in one dose.
2. Give 300 mgm as the 1st dose.
3. Give 100 mgm on each subsequent day that prothrombin time is shorter than T-20.
4. Give no dicumarol on days when prothrombin time is longer than T-20.
5. If patient is resistant to dicumarol increase dose from 100 to 200 mgm on each day that the prothrombin is shorter than T-20.

If the prothrombin time is longer than T-10 for two successive days administration of 36 mgm synthetic Vitamin K intravenously is recommended.

Prothrombin determinations should be made each day before that day's dicumarol is prescribed, daily, and continued as long as the drug is administered. If dicumarol therapy is controlled in the fashion outlined the chances of untoward reactions are reduced to a minimum.

[1] Anticoagulant Therapy in Cardiovascular Disease, E. A. Hines, Jr., and N. W. Barker, Med Clin N.A. 33:335 (July) 1949

IX. "Radical" Conservative Surgical Management of Perforated Peptic Ulcer - Lt. Col. Sanford W. French, III, MC and Capt. William J. Hills, MC, 118th Station Hospital, APO 24-5.



During the last four years the senior author has observed and treated non-surgically thirty-four consecutive patients with perforated peptic ulcer without mortality. This series has been reported by Seeley and his coworkers (1). Early in the series we were somewhat concerned with the length of time from perforation to the time that actual treatment was instituted and the interval of time that had elapsed since the patient had had a meal. However, as the series progressed, we became concerned less and less with these two factors. It has been stated by some authors that it is useless to close a perforated peptic ulcer twelve hours after the perforation; other authors set their time limit at eighteen hours. In this series the elapsed time interval from actual perforation to the time treatment was instituted varied from one half hour to three days.

In favor of the "radical" conservative management of these patients are many factors. To begin with these patients are usually a poor operative risk and it avoids the use of an anesthetic agent and an upper abdominal operation with all of its postoperative complications in an already seriously ill patient. The main complications are: subphrenic and other intra-peritoneal abscesses, atelectasis, pneumonia, wound evisceration and infection (25.4% of 772 cases (2)), and incisional hernia. It is quite surprising to operate electively these individuals from two to three months after perforation and find an almost completely normal appearing abdomen, whereas in an individual who had a perforation closed surgically, the direct opposite is usually found at later operation. There are many adhesions throughout the abdomen, and any operative procedure carried out at that time is made most difficult. In patients treated conservatively there is an initial generalized peritonitis which usually quickly becomes localized in the upper abdomen. Patients who are exposed to a laparotomy for closure of their perforations usually, due to operative trauma and spread of organisms throughout the abdomen, have a generalized and more severe peritonitis for a longer period of time than the non-operated group.

The mortality rate of cases operated was 23.4% in a series of 15,340 cases collected by DeBakey in 1940 for the ten year period 1930-1940. Since the antibiotics made their appearance, the mortality has been somewhat lowered although Moore and Hendricks (3) report a mortality of 18% in 101 cases in 1948.

MANAGEMENT: Immediately upon entry into the hospital the patient is taken to x-ray where upright and left lateral decubitus roentgenograms are made of the abdomen. If perforation has occurred, air will be seen under both leaves of the diaphragm, and along the right gutter in the decubitus film in about three out of four cases (4). A large caliber Levine tube is then passed into the stomach with its tip at the pylorus, the position of this tube being checked by x-ray. This is a most important step. Constant suction is then applied to the tube. The patient is placed on antibiotic therapy in the form of penicillin 100,000 units every four hours and is given sodium sulfadiazine intravenously, 2 grams initially and 1 gram every four hours. Morphine sulfate is given every four hours regardless of whether the patient is having pain or not. This drug is administered because of its effect of constricting the small bowel and relaxing the pylorus. As most peptic perforations are located in the first portion of the duodenum, the effect of this drug is that of closing the perforation somewhat and allowing reflux of the upper duodenal contents into the stomach where it will be picked up by the Levine tube. The patient is given whole blood as indicated and he is put on an intravenous fluid regime consisting of 1,000 cc of 5% glucose in water, 1,000 cc of normal saline and 1,000 cc of 1/6 Molar Sodium R-Lactate solution which is increased if necessary to insure a 24-hour urinary output of 1500 cc or more. Vitamins are administered in the intravenous fluids daily. The patient is kept in fluid and electrolyte balance by close observation of his daily blood chemistries and copper sulfate determinations. Serum amylase studies are done on all patients and EKG's taken on patients in the older age group.

TYPICAL CLINICAL COURSE: The typical clinical course of these patients is one of an acute illness for two days with board-like abdominal rigidity, elevated temperature and pulse. However, on the third day, the patient appears brighter. His abdomen is definitely beginning to soften and peristalsis is usually heard. On the fifth day the abdomen is usually quite soft and the patient feels quite well. On this day the tube is clamped off, and the patient started on a modified Sippy regime consisting of one ounce of half milk and half cream mixture every two hours and one ounce of amphojel every two hours alternating the two every hour. Most patients tolerate this modified Sippy regime quite well and if no pain or distention occurs after eight hours, the tube is removed. After the patient has been kept on this regime for 3 or 4 days, he is placed on an 8th day postoperative gastroenterostomy diet. At this time in some patients it will be necessary to add either amphojel or the mixture of half cream and half milk as inbetween meal feedings because of a recurrence of ulcer symptoms. However, this is usually not the case. At two weeks most patients are back on a regular diet and feeling quite well. The morphine is usually discontinued about the third day and the penicillin and sulfa administered until the patient has been afebrile for two days.

After two weeks the patient is usually transferred to the Medical Service where an upper GI series is done, and the patient placed on a dietary regime. Three complications occurred in the series: one right pleural effusion, one subphrenic abscess which resolved itself, and one right pleural effusion with subphrenic abscess which required surgical drainage. In considering the differential diagnosis of this condition the following must be kept in mind:

1. Acute cholecystitis
2. Acute pancreatitis
3. Ruptured appendix with peritonitis
4. Coronary occlusion
5. Dissecting aneurysm of the aorta
6. Superior mesenteric thrombosis
7. Acute gastritis
8. Gastric crisis of tabes dorsalis

Herein lies another value in this form of treatment. If the correct diagnosis should be one of

the above conditions instead of peptic perforation, laparotomy would certainly be futile and contra-indicated in all of them save possibly the acute cholecystitis.

It must be emphasized that the proper placing of the tip of the Levine tube at the pylorus and the maintenance of constant suction is the most important feature in the treatment described here. Where there are insufficient personnel or personnel available are not adequately trained to establish and maintain continuous decompression, this type of management is strongly recommended against.

We have recently treated two cases of proven peptic perforation at the 118th Station Hospital using the method of treatment as described with this modification of antibiotic and chemotherapy: Instead of administering penicillin and sodium sulfadiazine every four hours intramuscularly, 2,000,000 units of penicillin, 1 gram of streptomycin and 6 grams of sodium sulfadiazine in 2,000 cc of 5% glucose in water are given as a constant intravenous drip every 24 hours. These case reports follow:

A 20 year old, white male soldier, J.F.C., entered the hospital at 0415 hours on 20 July 1949, complaining of severe pain in the upper abdomen. Ten hours before admission while eating dinner, he was seized with sudden, severe, non-radiating cramp-like pains in the upper abdomen and lower chest. He walked to his barracks and collapsed. For the past several months before this attack, the patient had experienced occasional cramp-like pains at night, but for the past few weeks he had been practically asymptomatic. His father had stomach ulcers. On admission his temperature was 99° and pulse, 88. He appeared acutely ill and was in severe pain. The upper abdomen was board-like with marked tenderness in both upper quadrants. X-rays of the abdomen taken in the upright position revealed free air under both leaves of the diaphragm. WBC was 20,300; Polys 80; Lymphocytes 20. A diagnosis of perforated peptic ulcer was made.

A Levine tube was passed into the stomach and constant suction was started. The patient was placed on 4,000 cc of intravenous fluids daily with supplemental vitamins and penicillin, streptomycin and sulfadiazine were given intravenously in a constant drip. Morphine sulfate grains 1/4 was given every 4 hours. He was transfused with 500 cc of whole blood the first hospital day. The second hospital day the temperature rose to 104° and the abdomen remained rigid and tender. By the fourth hospital day the temperature was 102°, the abdomen was soft and only slightly tender. After the eighth day the temperature did not rise above 100°, and the abdomen remained soft. The WBC had dropped to 9,000. On the ninth day the tube was removed and the patient put on a milk and cream diet with amphojel. Two days later he was placed on a progressive gastro-enterostomy diet. Intravenous antibiotics were continued until the 14th hospital day. Three weeks after hospital entry he developed a severe, acute thrombophlebitis in his left leg, and was treated with heparin and dicumarol and subsequently recovered. He has had no more abdominal pain or tenderness. This case ran a somewhat atypical course because it is thought that due to stoppage of the Levine tube about the third day the patient had a reopening of the perforation.

A 25 year old, white male soldier, G.C.S, entered the hospital on 3 May 1949, complaining of severe pain in the upper abdomen of 6 hours duration. This pain came on suddenly and was followed by nausea and vomiting. There was no previous history of abdominal pain. On admission the temperature was 99.4°, pulse 100. The upper abdomen was board-like. The WBC was 10,250 with 87% Polys and Lymphocytes 13%. X-ray examination revealed free air under both leaves of the diaphragm. This patient was treated as was the first case with constant suction, intravenous antibiotics, intravenous fluids and morphine. The temperature rose to 102.4 the second hospital day. His WBC was 11,550 with Polys 80% and Lymphocytes 10%. The lower abdomen was somewhat softened and moderately tender in both upper quadrants. The temperature gradually receded, and by the 4th hospital day was 100° and did not go above this thereafter. On this day the tube was removed, and the patient placed on a modified Sippy regime. The abdomen was soft and non-tender, and the patient ambulatory. Antibiotic therapy was discontinued the 16th hospital day, and the patient discharged three weeks after his hospital admission.

SUMMARY:

1. A method for the non-operative treatment of perforated peptic ulceration is described.
2. There were no deaths in 34 consecutive cases treated by this method.
3. Complications are fewer using the non-operative treatment than in patients subjected to laparotomy.
4. Two case reports are presented.

REFERENCES: (1) Seeley, S.F., Horgan E., Henry, J.R., and Bertram, H.F.,"Bulletin of the U. S. Army Medical Department", 1949, 2:124-130
(2) DeBakey, M., "Surgery", 1940, 8:852-884 and 8:1020-1076
(3) Moore, S.W., and Hendricks, R., "Surgery", 1948, 23:442-449
(4) Luer, C.A., "Surgery", 1949, 25:418

X. Clinical Results of the Use of Penicillin in the Treatment of Syphilis* - Dr. Bruce Webster, Associate Professor of Clinical Medicine, Cornell University Medical College, New York, N.Y. Presented at Grand Rounds, Hospital Auditorium Tokyo General Hospital, Tokyo, Japan

From the first recognition of syphilis in Europe in 1493 to June 1943, a period of 450 years, the questions uppermost in the minds of the physician faced with the problem of treating syphilis have been what therapeutic agent shall I use? in what dosage? and for how long? In their simplest forms these questions resolve to the time-dose relationship.

Since mercury was first used in the treatment of syphilis, attempts to solve this problem have been on individual basis rather than on an organized one. Although arsenic was introduced in the treatment of syphilis in 1909, there was no real agreement among clinicians as late as 1943 as to the exact, time-dose relationship necessary to cure the various forms of the disease.

In June 1943, Mahoney, Arnold and Harris (1) demonstrated that penicillin was an effective therapeutic agent in early syphilis in the rabbit and in man. At that particular time, the armed forces had a special interest in syphilis since the country was entering into the early stages of World War II. Penicillin, being non-toxic, offered a therapeutic agent which had many advantages over poisonous arsenic and bismuth. In an effort to quickly obtain the maximum amount of information concerning the optimum time-dose relationship of penicillin in the treatment of early syphilis, a co-operative study was quickly organized under the leadership of Dr. J. E. Moore, of the Johns Hopkins Hospital. The Army, Navy, U. S. Public Health Service and certain selected University Clinics combined their efforts in this study. Schedules of treatment were assigned by a central committee and results of follow-up were combined in a central statistical unit. As a result of this planned study, carried out on large numbers of cases, and subjected to accurate statistical analysis, we now have, less than 6 years after its inception, considerable accurate and tangible information concerning the effectiveness of treatment schedules in early, and certain forms of late syphilis. Inadequate schedules were quickly abandoned and forms of penicillin with diminished power to destroy spirochetes were readily detected and discarded. Because of the very effective statistical analyses, pitfalls in drawing unwarranted conclusions concerning the results were avoided. As a direct result of this study, not only has the treatment of syphilis been advanced beyond the hopes of the greatest optimists, but, in addition, a method of co-operative research with a therapeutic agent has been established, which has already been adapted to other diseases.

The past four years have witnessed remarkable changes in the types of penicillin available to the physician. The original investigations were carried out with amorphous mixtures. With the development of crystalline penicillin-G, this form has supplanted all others in commercial use. Intensive studies have been carried on to develop action-delaying forms of penicillin. The first of these was penicillin in oil and beeswax. It did provide a form of administration which made the ambulatory treatments of syphilis possible. However, sensitivity to beeswax developed in many individuals. In February 1948, procaine penicillin became available. With this form, appreciable blood levels were present 24 to 36 hours after a single injection of 300,000 units. The incidence of sensitivity was low and the injection was painless. More recently, the addition of 2% aluminum monostearate to procaine penicillin has further delayed the absorption, so that, following a single injection of 1.2 million units measurable blood levels are available for 4 to 5 days. Since further advances in these action-delaying forms may be expected, it would seem that the day is not too far distant when infectious syphilis may be successfully treated with a single injection of one of these yet-to-be produced forms of penicillin.

At this time, it is important to realize, that in all probability, it is not necessary to maintain a continuously high plasma concentration level of penicillin in a disease in which the causative agent has so long a division time as T. pallidum. It has been shown that the day life of this organism is 30 to 33 hours. It would therefore seem justified, from a pharmocological point of view, to achieve the necessary lethal level only once in this time period. Clinical trials have already indicated that a single daily injection of adequate dosage of either aqueous crystalline penicillin-G, procaine, or procaine with aluminum monostearate is equivalent to the 2, 3, or 4 hourly schedules formerly used.

TREATMENT OF PRIMARY AND SECONDARY SYPHILIS:

Schedules ranging from 600,000 units to 9.6 million units of penicillin have been used in the

(* Given at The Medical Society of New Jersey, Atlantic City, 26 April 1949. From the Department of Medicine of the New York Hospital and Cornell University Medical College, New York, N.Y.)

treatment of primary and secondary syphilis and failure rates from 3 to 40% have been reported. It is therefore not surprising that confusion exists in the minds of many physicians as to how to treat syphilis. However, in spite of such conflicting reports, certain principles have been demonstrated. Since the day life of the spirochete is approximately 33 hours, any effective treatment must encompass at least two life spans or approximately 3 days. Mahoney and his associates (2) have recently stated that high levels of penicillin administered over 3 days would appear to have a failure rate of only 10%. Merrill (3) in a recent report of the co-operative study based on 3,000 cases of primary and secondary syphilis treated with crystalline penicillin-G over 7½ days on a two hourly or three hourly schedule reported as follows:

1. 2.4 million units was the optimum effective dose.
2. No statistical difference was observed in any increase in dosage over a total of 2.4 million units.
3. No difference was observed in the 2 hourly and 3 hourly schedules.

In the co-operative study reported by Merrill it should be pointed out that cumulative failure rates are used, and arbitrarily all patients developing a clinical or serologic recurrence, or even remaining sero-positive in moderate or high titre at the end of one year, are considered failures. It is now realized by the majority of workers that such an evaluation will include as failures a large number of reinfections and some sero-resistant cases.

The differential diagnosis between reinfection and infectious relapse in early syphilis is at the moment of major interest to students of syphilis. Formerly regarded as rare, we now know that reinfection and superinfection are not only possible in man and the experimental rabbit, but are, in all probability, a common occurrence. Why has our attention been suddenly directed to this phenomenon which was formerly thought to be practically non-existent? There are in all probability several reasons. The sexual habits of the syphilitic patient are not altered by the mere fact that he or she acquires syphilis. Under older methods of treatment such a patient was kept under the influence of arsenic or bismuth for approximately 18 months. Each weekly injection destroyed any new spirochetes which may have entered the body and, in consequence, reinfection was not observed. Today, with the maximum period of therapy of early syphilis being 8 days, the individual is left unprotected for the remainder of the time. It has been suggested that present day rapid treatment methods prevent the development of immunity. However, there is no proof of this. Whatever the mechanism, it is now apparent that many patients who have been adequately treated for primary or secondary syphilis, and who achieve negativity, develop new, darkfield-positive lesions at a different site with a subsequent rise in serologic titre. More often than not, careful epidemiological studies will reveal exposure to a case of infectious syphilis. A review of 140 instances of relapse or reinfection at the New York Hospital revealed that 70% of these cases were, in all probability, reinfection with only 30% true relapse or treatment failures (4).

The total failure rate reported by Merrill (3) in the co-operative study series of 3,000 cases of primary and secondary syphilis treated with 2.4 and 4.8 million units of penicillin over 7½ days was 10% at the end of the first year and 12% at the end of the second year. It must be remembered that this total failure rate includes all individuals manifesting clinical or serological evidence of syphilis during the time period included. If one uses the New York Hospital series as a criteria, 70% of these failures could properly be classified as reinfection if evaluated on the basis of history, clinical manifestation, serologic behaviour and epidemiological information. Others will have remained sero-positive in moderate titre throughout the period of observation (the so-called sero-resistant cases) and will have been classified as treatment failures at the end of one year in the present study. If one further deducts these cases which are sero-resistant, but remain clinically well, the total failure rate will be reduced by an additional 1 to 2%. Thus it would appear that treatment of primary or secondary syphilis with 2.4 million units of crystalline penicillin-G over 7½ days in all probability is followed by a very low true clinical failure rate -- probably less than 3%.

Certain other additional observations were reported by Merrill (3). There was an improvement in the failure rate if arsenic and bismuth was added to the penicillin regime. Minor racial and sex differences reported in the effectiveness of penicillin could be accounted for on the basis of difference in reinfection rates.

In about 60% of patients with primary or secondary syphilis, fever, with or without exacerbation of the mucocutaneous lesions has appeared within 12 hours after the start of penicillin therapy and lasted up to 24 hours. It is accompanied by a leucocytosis. This is the so-called Jarisch-Herxheimer reaction and need not be a cause for alarm. The mechanism is at present unknown.

The greatest advantage of penicillin over metal chemo-therapy is that it is relatively non-toxic. Cutaneous reactions, allergic in nature, occur in less than 1% of patients treated with crystalline

penicillin-G. These disappear promptly when the drug is stopped and, in many instances, the concurrent administration of one of the anti-histaminic drugs will allow the treatment with penicillin to be continued.

There is no clear cut evidence that penicillin resistance in syphilis exists. This is unlike the familiar arsenic and bismuth resistant syphilis and the behaviour of common bacterial infections to penicillin.

What of the patient, however, rare, who is not cured by penicillin. With this, as with all other forms of therapy for infectious syphilis careful follow-up is an important requisite. This should consist of clinical examination and the performance of a titred serologic test at monthly intervals. The use of the titred test here is essential if adequate progress of the patient is to be evaluated. The rate of serologic response follows closely that observed with intensive arsenical therapy (5), the majority achieving sero-negativity in 6 to 12 weeks. Variations do occur and a small number may continue to show a low titre at the end of one or two years. These represent the sero-resistant group. For practical purposes the co-operative study of the National Institute of Health has defined sero-resistance at the level of 16 Kahn units or 4 dilution units at the end of one year. Whether or not the eventual outcome of this group will be influenced by further treatment is open to question.

The failures will consist of the group manifesting new clinical lesions and those exhibiting sustained significant sero-relapse during the follow-up period. These two latter groups require retreatment whether the cause be reinfection or recurrence of the original infection. There is rapidly increasing evidence that retreatment with the same dosage of penicillin used in the original treatment is effective in these cases. This is an argument in favor of reinfection rather than relapse.

No mention has been made of the treatment schemes which combine penicillin and arsenic and bismuth. Advocated early in the history of penicillin therapy of syphilis, on the argument that they exerted a synergistic effect, they gained considerable popularity in spite of the fact that the use of arsenic defeated the major advantage of penicillin, namely absence of toxicity. With clarification of our knowledge of the value of penicillin, less and less mention has been made of these treatment regimes. It is now generally agreed by the majority of investigators that arsenic and bismuth have no place in the treatment of syphilis.

Thus, it would appear that primary or secondary syphilis may be successfully treated with 2.4 million units of aqueous crystalline penicillin-G, or procaine penicillin, administered in 8 daily doses of 300,000 units each. The failure rate with such a form of therapy is low, probably not over 3%, if one deducts the probable reinfections. This treatment is not associated with any risk and may be carried out on an ambulatory basis. Prolonged clinical and serologic follow-up is necessary.

LATENT SYPHILIS:

How shall we treat latent syphilis with penicillin? Latent syphilis, is that stage of the disease in which the patient has no symptoms or physical signs and is detectable only by the serologic test for syphilis. The use of penicillin in this form of the disease is based on the assumption that, since it is effective in the treatment of early and late syphilis, it may be expected to prevent the development of clinical manifestations in latent syphilis. A post-treatment observation of 10 to 20 years will be necessary to prove that penicillin offers the 95 to 98% chance that is offered by heavy metal therapy in latent syphilis. Preliminary studies have indicated that adequate treatment will produce a slightly better incidence of sero-reversal in early latent syphilis than will the 26-week arsenic-bismuth regime. At the New York Hospital, latent syphilis is treated with 600,000 units of procaine penicillin twice weekly for 6 weeks -- a total of 7.2 million units. Over 70% of 48 cases of early latent syphilis treated by this method have shown a sustained sero-reversal. The Army (6) recommends 600,000 units daily for 10 days, totalling 6 million units. In general, the recommendations for latent syphilis increase the time period of administration over that for early syphilis. It is important to remember that a certain percentage of cases of latent syphilis will remain sero-resistant irrespective of the amount of treatment given them. Penicillin will not reverse the serologic test in a case which has proven sero-resistant to adequate arsenic therapy. It behooves the physician to evaluate the adequacy of previous therapy and determine whether or not a given case of latent syphilis has had sufficient therapy and is sero-resistant or whether it needs treatment with one of the penicillin schemes.

SYPHILIS IN PREGNANCY:

The problem of the treatment of syphilis in pregnancy has recently undergone considerable clarification. Previously untreated syphilis discovered during pregnancy may be handled by the approved

schedules or the penicillin treatment of early syphilis. There are no toxic reactions and, because of the rapidity of treatment, a normal infant can be expected, even if the disease is discovered late in the pregnancy. Although for many years it has been the custom to re-treat syphilitic mothers during each pregnancy, considerable doubt has existed in the minds of clinicians as to the necessity of this. Goodwin and Farber (7) in 1948 reported on 570 pregnancies in women previously treated with heavy metals and penicillin, and allowed to go untreated through the pregnancy. Ninety-two percent of the infants were born alive and no evidence of syphilis was noted in either the living or the still-born infants. Since that time, other clinics have reported similar results. It would now appear to be safe to allow a mother to go untreated through a pregnancy provided:

1. She has had adequate therapy prior to the pregnancy.
2. She shows no clinical evidence of activity of the disease.
3. She is sero-negative or sero-positive in low titre (less than 16 dilution units).

CARDIOVASCULAR SYPHILIS:

If untreated, approximately 10% of all cases of early syphilis will develop cardiovascular involvement. The clinical picture varies widely depending on the extent and site of the pathological process. Briefly they may be classified as follows:

1. Uncomplicated Aortitis-manifested only by infiltration of the Aortic wall, with or without diffuse dilation (5.3%)
2. Aneurysm-due to the destruction of elastic tissue and the consequent localized sacular dilation (1.2%)
3. Encroachment of the lesion downward on the Aortic leaflets with resulting Aortic Insufficiency (2.7%)
4. Encroachment of the lesions on the Coronary ostia-with characteristic symptoms (approximately 0.5%)
5. Syphilitic myocarditis (approximately 0.2%)

The problem of clinical recognition of cardiovascular syphilis before irreparable anatomic damage has been done is an important one. Uncomplicated Aortitis presents the greatest difficulty in this regard. It is essential that all cases of late syphilis be carefully evaluated in regard to the presence of early Aortitis. Although there is disagreement among students of the disease on this point, we believe that the following clinical criteria are of importance.

1. X-ray demonstration of dilation of the first portion of the Aorta.
2. Demonstration of dilation of the Aorta by angiocardiography.
3. Lowered cardiac reserve with absence of hypertension or valvular disease.
4. Characteristic changes in the Aortic 2nd Sound.
5. Moore (8) stresses the significance of localized substernal pain (differentiated from anginal pain as not being influenced by exertion nor referred down the arm).

In spite of the most painstaking examination and history, a large number of cases will escape clinical diagnosis.

Although there are still some skeptics, we believe that it has been definitely established that the treatment of cardiovascular syphilis with anti-syphilitic agents brings about alleviation of symptoms and probable prolongation of life. Data collected by Moore (8) and more recently at the New York Hospital (9, 10) indicates that the prognosis of syphilitic heart disease is considerably better than standard textbook accounts would indicate. Whether or not improvement in the pathologic lesion in cases which receive adequate anti-syphilitic therapy parallels the clinical improvement is still problematical. Restoration to normal structure of an Aorta once damaged by syphilitic Aortitis is not to be expected; but, an arrest of the disease by means of anti-syphilitic therapy, with the formation of a fibrous scar and the regression of inflammatory cellular infiltration in the tissues would seem to be a possibility.

There are in the medical literature surprisingly few accounts of the comparison of the pathologic picture in treated and untreated syphilitic Aortitis. Webster and Reader (11) have reviewed the microscopic findings in the Aorta in 45 cases of this disease -- approximately half of which received adequate anti-syphilitic treatment and the other half of which received little or no treatment. All of the untreated cases showed evidence of an active syphilitic process in the Aorta-as manifested by endarteritis, perivascular lymphocytic infiltration, and the presence of plasma cells. On the other hand, in the adequately treated group, 84% failed to show evidence of activity. Although the series is small, the results would seem to be in keeping with the concept that adequate anti-syphilitic therapy of syphilitic Aortitis brings about an arrest of the active syphilitic process associated with

relief of symptoms and probably prolongation of life.

In any consideration of the treatment of cardiovascular syphilis, it is important to remember that the adequate treatment of early or latent syphilis will entirely prevent cardio-vascular involvement. Amounts of treatment which are totally inadequate to prevent neuro-syphilis will prevent the development of cardiovascular lesions.

Once lesions have developed in the aorta, the aim of treatment would seem to be the arrest of activity in these areas. There are certain essentials on which the formulation of a treatment scheme for any patient with cardiovascular syphilis are based. These are:

1. A clinical evaluation of the location and extent of the anatomic lesion and the consequent physiologic disturbances.
2. Permanent limitation of physical activity to a degree dictated by the extent of involvement.
3. General medical care with special reference to the use of digitalis and mercurial diuretics.
4. Specific anti-syphilitic treatment.

Prior to the advent of penicillin, there was fairly general agreement that, once compensation was restored, the treatment of uncomplicated Aortitis, syphilitic Aortic insufficiency and aneurysm should consist of two years of alternate courses of bismuth and arsenoxide.

Since so much uncertainty exists as to the effect of heavy metal treatment on cardiovascular syphilis, it can readily be seen that no estimate of the value of penicillin is possible. A full evaluation can be made only after many years of observation of treated cases.

Individual clinics are carrying out experimental treatment of cardiovascular syphilis with penicillin. Moore (12) suggests the use of 5 to 10 million units, over 15 to 21 days. The Veterans Administration (13) recommend 6 million units administered over 15 days.

At the New York Hospital, patients with cardiovascular syphilis receive 300,000 units of penicillin daily for 14 days, followed by 300,000 units twice weekly for 10 weeks. This makes a total of approximately 10 million units.

The great increase in the time period over which the patient receives treatment is prompted by the observation that healing of the lesions of cardiovascular syphilis progressed more slowly under older methods of therapy than lesions elsewhere.

The fear that a Herxheimer effect might result from the treatment of cardiovascular syphilis was expressed by many writers on the subject. Experience has proven that this is not the case and that previously untreated patients can be started on full doses of penicillin with safety.

CENTRAL NERVOUS SYSTEM SYPHILIS:

Since the outcome of treatment is neurosyphilis is predominately dependent on the type of the disease present, it is perhaps advisable to discuss briefly the classification of neurosyphilis.

Inflammatory Types:

1. Asymptomatic neurosyphilis
2. Acute syphilitic meningitis
3. Diffuse meningovascular syphilis

Degenerative Types:

1. Tabes dorsalis
2. Paresis
3. Primary optic atrophy

The combinations, in varying degree, of these lesions in most patients with neurosyphilis is the root of the difficulty of accurate clinical diagnosis and subsequent evaluation of therapy. As may be expected, the degree of degeneration of nerve tissue which has occurred before treatment is begun, determines the extent of failure of any form of therapy.

Opinion is divided as to the proper role of penicillin in the treatment of neurosyphilis. One school of thought feels that it may be used alone; the other recommends concomitant penicillin and malaria as the treatment of choice. There is universal agreement that penicillin alone, in dosage ranging between 2.4 and 6 million units over a 2 week period will accomplish as much as two years treatment with heavy metals.

Gammon (14) has reported recently on the pathological examination of brain tissue of paretics previously treated with penicillin. With the exception of one case which had received the penicillin

only 3 weeks before death, they showed tissues cleared of the inflammatory signs usually seen in paresis.

A paradox of the penicillin treatment of neurosyphilis is that excellent results are obtained after the intra-muscular administration of the drug, although penicillin cannot be demonstrated by the usual techniques in the spinal fluid, if the dosage is relatively low. This led earlier workers to administer the drug intra-thecally. The hazards were such that this has been abandoned.

The results of treatment of neurosyphilis may be evaluated in two ways:

1. The cell count, spinal fluid protein, colloidal gold, and Wasserman compliment-fixation tend toward normal, in the order named.
2. Clinical improvement may be evaluated.

Both methods have their advocates and both have disadvantages. A combination of the two would appear to be best.

The results of treatment of the inflammatory types of neurosyphilis, e.g., asymptomatic neurosyphilis, acute syphilitic meningitis and meningovascular syphilis, with 4.2 or more million units of penicillin in 300,000 unit daily dosage for 14 days are excellent. Cell count and protein levels reach normal in approximately 6 months and the compliment fixation tends toward normal. Improvement may continue up to 24 to 36 months after cessation of therapy.

Disagreement exists as to whether the degenerative forms of central nervous system syphilis, e.g., tabes, paresis and primary optic atrophy should receive penicillin alone or penicillin with concurrent malaria. Stokes, Steiger, and Gammon (15) have used penicillin alone. Seventy-four percent of spinal fluids were either rendered normal or were markedly improved. Marked symptomatic improvement occurred in 46% of paretics and 33% of the tabetics. Rose and Solomon (16) have used concurrent penicillin and 4 to 6 paroxysms of induced malaria. It is important to remember that these authors, working in a psychopathic hospital may see more advanced paresis than some of the other reporting clinics. Regarding "improvement" as ability to be discharged from the hospital, they found 67% of their paretics in that category following penicillin and malaria. In addition some of the cases received shock therapy. They point out that these cases with an effective syndrome offer a better prognosis than those with a schizophrenic one.

Thus it can be readily seen that confusion still exists as to the best method of treatment of the degenerative forms of central nervous system syphilis.

At the New York Hospital, we use 4.2 million units of penicillin alone in a daily dosage of 300,000 units for 14 days in all forms of central nervous system syphilis, except primary optic atrophy.

The patients are followed as to clinical improvement, and spinal fluid changes. If no improvement occurs at the end of one year or the patient regresses at any time, tabetics and paretics are retreated either with penicillin alone or with penicillin and malaria depending on the severity of the case.

In view of the inadequacy of available data and the urgency of the situation, it appears to be generally agreed that patients with primary optic atrophy should receive the benefit of both penicillin and malaria.

SUMMARY:

In summary, it would appear that the penicillin treatment of forms of syphilis offers a safe, rapid, and in most forms, a moderately sure method of therapy. 2.4 or more million units of crystalline penicillin-G given in 8 daily doses of 300,000 units each, provide adequate therapy for primary and secondary syphilis and result in a failure rate probably as low as 3%.

Latent syphilis and cardiovascular syphilis, by analogy, in all probability, may be successfully treated with penicillin. The latter perhaps will require treatment over a longer time period.

Disagreement exists over the best method of treating central nervous system syphilis. The inflammatory forms of this disease, e.g., asymptomatic, acute syphilitic meningitis, and meningovascular syphilis may be successfully treated with 4.2 million units of penicillin given over 14 days. In the opinion of many observers, the same therapy is effective in tabes dorsalis and paresis. Others advocate concurrent penicillin and malaria in these forms of the disease. Further investigation on a long range basis should provide the answer to this question.

Much has been accomplished since penicillin was first used in the treatment of syphilis in

1943. The future would seem to lie in the development of action-delaying forms of penicillin which would tend to shorten the period of treatment and in the development of newer antibiotics which have a stronger spirochetocidal power.

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XI. Intravenous Alimentation and Preoperative Preparation - Capt. R. J. Burkhard, MC, presented at a Surgical Conference, Tokyo General Hospital, Tokyo, Japan. (Part I of Two Parts)

In no other phase of the surgical management of a patient does more diversity of opinion exist than in parenteral alimentation. Toward the end of placing intravenous alimentation on a rational and mathematical basis this paper is presented.

The four phases to be considered are:

1. Metabolism and requirements of protein, carbohydrate and fat; total caloric requirements; vitamin requirements.
2. Water and electrolyte balance.
3. Formulae for control of alimentation.
4. Preoperative preparation of the patient.

PROTEINS:

Proteins are the most important item in any prolonged parenteral alimentation. The essential amino acids are the important constituents of protein foods. All 10 amino acids are present in adequate amounts in the standard protein hydrolysates on the market today. Of newer importance is a substance, strepogenin, a peptide found in casein and other proteins, not a protein substance itself, but vitally important in maintaining human metabolism. The requirements have not yet been established. It is not present in the acid or alkaline protein hydrolysates. It can be supplied by giving small amounts of milk or cheese, supplementarily. This substance is present in enzymatic protein hydrolysates are not universally available and are very expensive, therefore prohibitive at the present time.

The protein requirement is 1 gm./kilo/day for a normal individual. The protein minimum is 0.4 gm./kilo/day. At this latter level the patient will be wavering between positive and negative nitrogen balance and the body is beginning to mobilize tissue proteins for energy. Post-operatively approximately 2 gms./kilo/day should be given. Increased protein requirements are necessary, also, in undernourished patients, pregnancy, lactation and childhood.

The level of protein metabolism for all practical purposes can be measured by the output of urinary nitrogen; 1 gm. of urinary nitrogen represents the metabolism of 6.5 gms. of protein. Normal urinary nitrogen output/24 hrs. is approximately 13 gms.

The total blood protein has a normal value of 7-10 mgms.%. The albumin-globulin ratio is normally 1.5.

Proteins are principally used for:

1. Body growth.
2. Tissue repair.
3. Maintenance of the plasma proteins.
4. Prevention of toxic liver damage.
5. Conversion to sugar.
6. Storage for future use.

Tissue repair is directly related to protein balance and in protein deficiency and negative nitrogen balance tissue repair is impossible. Body growth varies in the same direction.

Proteins also are important physiological detoxifiers, combining with chemical toxins of anesthetic or pathological origin in the liver, rendering them inert or are excreted in the urine in a combined from with the toxins.

The plasma proteins are of importance in: 1. Controlling osmotic pressure of the blood (albumin). 2. Maintaining a normal clotting mechanism (fibrinogen). 3. Maintaining blood ph (hemoglobin). 4. Maintaining water balance (albumin). 5. Transporting food stuffs to tissue (amino acids). 6. Providing antibodies to combat infection (globulin). 7. Promoting hematopoiesis (globulin).

The principal channels of protein loss are: 1. Disease of the gastro-intestinal tract with impaired protein absorption. 2. Lack of protein intake. 3. Liver pathology preventing utilization. 4. Shock. 5. Hemorrhage. 6. Exudates. 7. Certain adreno-cortical lesions in which protein catabolism is increased. 8. Hyperthyroidism with its increased tissue metabolism. 9. Pituitary pathology.

Some important miscellaneous points in protein metabolism are:

1. Carbohydrates and fat are protein sparers (carbohydrates are the best) and the body will oxidize these substances in preference to proteins for energy if they are present in quantities above the basal metabolic requirements.

2. Proteins have a specific dynamic action greater than carbohydrate or fat and increase the BMR 30%.

3. When total calories and proteins are restricted, water should be restricted too as nitrogen excretion is increased in such a situation by large amounts of fluid.

4. In burns, the great loss of nitrogen is due to the raiding of tissue proteins molecules for methionine.

5. Parenteral amino acid therapy in patients with severe hepatic damage has occasionally led to a fatality probably due to accumulation of proteins in the blood stream.

6. A normal person can metabolize 10-15 gms. of protein per hours. This is decreased 50% in moderate hepatic pathology.

7. 10 gms. of nitrogen are required for a normal 70 kilo adult/24 hours. Post-operatively, 12 gms. of nitrogen are necessary for maintaining positive nitrogen balance.

8. A helpful procedure with reference to blood transfusions in order to prevent reaction and subsequent precipitation of hemin in the kidney is to give 250 cc 1/6 Molar lactate prior to the transfusion in order to alkalinize the patient and prevent precipitation of decomposition products of incompatible blood.

CARBOHYDRATES:

The principal functions of carbohydrates are as follows:

1. Converted to CO_2, H_2O and energy
2. Antiketogenic properties (for starvation or toxic (anesthetic) ketosis)
3. Protein sparers
4. Detoxification of harmful metabolites and chemical toxins
5. Converted to fat
6. Maintain osmotic pressure of blood
7. Protector of liver in event of bombardment by toxins
8. Storage for future use in liver and muscles

Carbohydrates may be used for the major caloric portion of the diet.

The ketogenic-antiketogenic ratio should be less than 2. A simple rule to follow is: In the diet, the gms. of fat should be less than twice the number of gms. of carbohydrate plus 1/2 the number of gms. of protein.

It is important to note that certain inhalation anesthetics are glyo-geolytic and that they destroy tissue glycogen.

The normal blood sugar is 90-120 mgms %.

A normal patient can metabolize 1 gm. of glucose/kilo/hr. This figure is reduced 50% if the liver is damaged.

The carbohydrate requirement varies between 150-250 gms./day. In order to fulfill this requirement, 10% glucose may have to be used. Recent investigation has proven that 10% glucose does not lead to diuresis unless given over 70 gms./hr and unless a glycosuria is produced first. Thrombosis is also very rare with 10% glucose.

FATS:

Fat metabolism is relatively unimportant in our present consideration as they are not used in short intravenous alimentation regimes.

Fats are principally used for: 1. Conversion to glucose. 2. Oxidization to CO_2, H_2O and energy. 3. Solvents for the fat soluble vitamins (KADE). 4. Provision of labile methyl groups for formation of choline.

The normal caloric fat requirements are from 60-80 gms./day. The normal total blood lipid value is about 600 mgms%.

CALORIC REQUIREMENTS:

A patient at bed rest normally needs 12 calories/lb (25 calories/kilo), roughly 1600-1800 calories per day. This figure is very difficult to attain in parenteral alimentation regimes because hypertonic solutions are not routinely available and some difference of opinion has been existent about their usage. Also, most patients on prolonged intravenous alimentation are able to take 300-400 calories orally as liquid nourishment and the difference is made up in this fashion. Approximately 1200 calories are necessary as a minimum below which vitamin utilization is impaired. The major caloric portion of the intravenous alimentary diet is to be derived from carbohydrates with 70-140 gms. of protein given as a must.

VITAMINS:

Vitamins are very important in the alimentation of a surgical patient. Vitamin A is necessary for epidermal integrity and since it is stored in the liver for considerable periods of time, it need not be added in short alimentary regimes. It may be given orally in prolonged intravenous alimentation.

Vitamin K is necessary for maintaining a normal clotting mechanism. 2.4 mgms/day is an adequate therapeutic dosage for postoperative cases.

Vitamin D figures most prominently in regulating normal calcium metabolism. It, like vitamin A, is stored and is not needed in short intravenous alimentary regimes. It may be supplied orally in long intravenous alimentary regimes.

Vitamin B_1 and riboflavin, nicotinic acid and pantothenic acid are necessary for normal tissue oxidative processes. The requirements of thiamine is 25 mgms/day. The requirements of nicotinic acid is 50-100 mgms/day. The requirements of riboflavin is 10 mgms/day. Calcium pantothenate should be given in 5-10 mgm doses every day.

Vitamin C is probably the vitamin of extreme surgical importance. It is necessary for the fibroblastic repair of injured tissue as well as to maintain normal capillary permeability. Wound healing may be increased 30% by administering massive doses of vitamin C. Vitamin C is only stored for 4-6 hours in the liver when given in massive doses thus necessitating frequent administration to maintain a therapeutical level. Requirements normally are 25 mgms/day, however a therapeutic dose should approximate a total of 1000 mgms/day in divided doses.

Total caloric intake directly influences the utilization of the vitamins. 1200-1600 calories are needed before vitamin utilization occurs in a satisfactory degree.

Vitamins should be administered in massive doses as there is relatively little chance of producing a hypervitaminosis as compared with the risk of producing an avitaminosis.

WATER AND ELECTROLYTE BALANCE:

Water and electrolyte balance is probably the most troublesome feature of any intravenous regime. This subject has to be considered almost totally mathematically.

The normal channels for water loss and the amounts lost via these channels are:

Evaporation from skin	1500 c.c.
Gastrointestinal tract	150 c.c.
Urinary loss	1500 c.c.
Respiratory loss	500 c.c.
	3650 c.c. (approximate)

The normal intake is:

Fluid intake	3000 c.c.
Food water (70% of weight of food)	650 c.c.
	3650 c.c. (approximate)

Evaporation from the skin is constant in temperate climates, usually, but fluid loss can be increased 100-600% by high fevers and sweating. Little salt is lost by normal evaporation but in profuse sweating, much chlorides may be lost. Sweat contains 3 gms. of salt/1000 c.c. of sweat. Approximately 3 gms. of salt should be added to the daily requirements of 6 gms. during the summer months, bringing the total to 9 gms./day.

Loss of fluids via the gastrointestinal tract is constant under normal conditions, but, if the patient has diarrhea, much sodium and water may be lost and if the condition remains uncorrected, acidosis may eventually result. Vomitus and Wangensteen drainage are channels of chloride loss from the stomach. If uncorrected, an alkalosis may result. Vomitus or Wangensteen drainage contains 5 gms. of chlorides/1000 c.c. It is imperative that this be replaced in the body. Also, in calculating chloride loss in a patient with a Wangensteen suction, it is necessary to subtract the amount of oral fluids from the amount of fluid in the suction bottle in order to ascertain the true volume of gastric juice lost by suction.

Kidney excretion is variable and fluctuates rapidly with disease. The kidney conserves water by concentrating the urine in event of dehydration. Thus, if the specific gravity of the urine increases: 1. the body needs water, or 2. too much salt is being given.

The lungs excrete a constant amount of water but an increase is noted in (1) respiratory embarrassment with rapid respirations and (2) dry warm environments. Rapid breathing tends to produce an alkalosis as CO_2 is removed from the blood at an increased rate and base loss does not compensate immediately.

Some of the signs of excessive water loss are: 1. Inability to maintain blood pressure.

2. Temperature increase. 3. Increase in pulse rate. 4. Cerebral symptoms (decreased sensory acuity, spots before the eyes, etc.). 5. Weakness, nausea, collapse, dry tongue, loss of normal skin turgor, and acidosis. If a patient has manifested clinical evidence of dehydration, approximately 6% of his body weight has been lost as fluids and the amount necessary to make up the deficit can be calculated as follows: .06 x weight of patient in grams equal cc of fluid to be replaced. E.G. - .06 x 70,000 = 4,200 c.c. THIS IS TO BE ADDED TO THE DAILY FLUID INTAKE OF 3,500 c.c. This amount of fluid must be given cautiously over a long interval(24-36 hours) and as much as possible by routes other than intravenous.

During an average major operation from 500 - 1500 c.c. of fluid may be lost. This may be replaced during the operation as 5% Glucose in distilled water.

The daily fluid requirement is approximately 3500 c.c.

Loss of salt in the surgical patient occurs concomitantly with dehydration. Chloride balance is measured by plasma chloride studies, the normal plasma chloride value being 500-600 mgms%. The normal salt requirement is between 5-6 gms./day.

Some important points in salt metabolism are:

1. A great amount of chlorides may be given without noting much change in the plasma chloride values.
2. After a major surgical procedure the kidney fails to excrete appreciable amounts of sodium in the urine for 24-48 hours.
3. An excess of sodium may lead to tissue edema, slow wound healing, and the sweeping of plasma into the tissues or urine.
4. If there is a hypoproteinemia and saline is administered, water loss is increased.
5. 1/2 normal saline is preferable to normal saline for intravenous alimentation, however if normal saline is given slowly, it may be used.
6. In general, water and salt balance may be said to be adequate if the urinary volume is over 1500 c.c/24 hours, and the urinary excretion of salt is 3 gms./24 hours.
7. If the urinary output is above 1500 c.c., the NPN is very unlikely to rise.
8. For each 9 gms. of salt given that is not needed, 1000 c.c. of fluid accumulates in the tissues.
9. Fluid and electrolyte balance are only possible when the blood proteins are maintained in a normal range.
10. A minimum of 500 c.c. urinary volume (24 hours) is absolutely necessary to excrete the amount of solids which are normally excreted/24 hours.

Below are listed some of the clinical signs and differentiation of the most common water and electrolyte disturbances.

MANIFESTATION	PURE WATER DEPLETION	PURE SALT DEPLETION
Dehydration	+++	+++
Thirst	+++	Absent
Lassitude	+	+++
Orthostatic Fainting	Absent Until Late	+++
Urine Volume	Scanty	Normal till Late
NaCl in Urine	+	Absent Unless Addison's Disease
Vomiting	Absent	+++
Cramps	Absent	+++
Plasma NaCl	Normal	Decreased +++
Blood Urea	+	+++
Plasma Volume	Normal till late	Decreased +++
Hemoconcentration	Normal till late	+++
Blood Pressure	Normal till late	Low +++

RETENTION OF WATER	RETENTION OF SODIUM
Nausea Vomiting Bradycardia Dimness of Vision Muscle Twitching Urine Specific Gravity Low Urine Chlorides Reduced Hematocrit Low	EDEMA: Edema of hypoproteinemia, congestive heart failure and kidney disease to be considered.

The following is an example of an adequate intravenous alimentary regime.

	Fluids	Protein	CBH	Calories	Nitrogen	Salt
0600 Hours						
1000 c.c. 10% glucose in D/W	1000		100	400		
Add: 300 mgm. Ascorbic Acid						
10 mgm. Thiamine HCl						
50 mgm. Nicotinic Acid						
5 mgm. Calcium Pantothenate						
2.4 mgm. Alpha Menadione						
1200 Hours						
1500 c.c. Protein Hydrolysate	1500	75	75	600	9	
1800 Hours						
750 c.c. 5% Glucose in N/S	750		40	160		6
Add: 300 mgm. Ascorbic Acid						
10 mgm. Thiamine HCl						
50 mgm. Nicotinic Acid						
5 mgm. Calcium Pantothenate						
2.4 mgm. Alpha Menadione						
250 c.c. 1/6 Molar Lactate (If sulfadiazine needed add 2.5 gms.)	250					
TOTAL	3500	75	215	1160	9	6
MINIMAL REQUIREMENTS	3500	70	200	1200	10	6

This regime:

1. Meets all the minimal requirements for fluids, electrolytes, proteins, carbohydrates, calories and nitrogen.

2. A 1-1 ration of proteins to carbohydrate is exceeded thus preventing the body from utilizing tissue proteins.

3. The carbohydrate is given prior to the protein thus exerting a protein sparing action and necessitating a smaller amount of intravenous proteins.

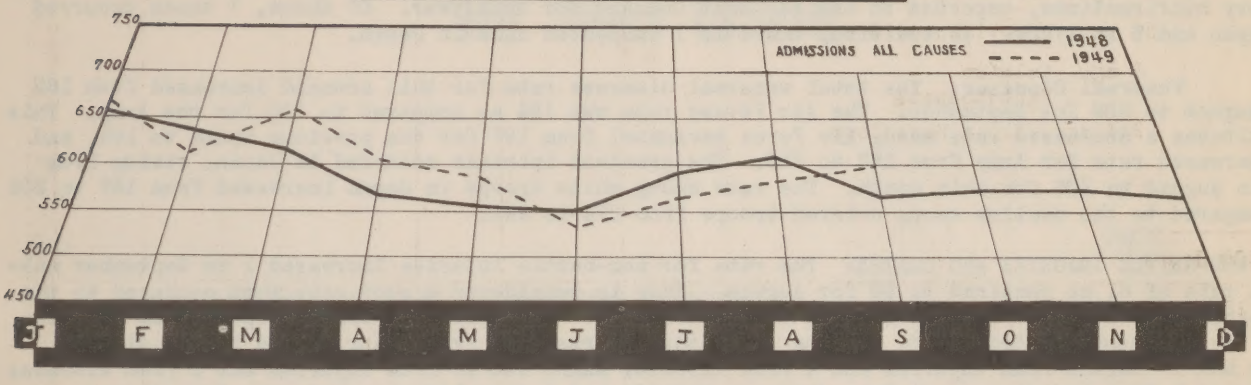
4. The patient is able to sleep for 8 uninterrupted hours as no part of the intravenous alimentation extends beyond 2200 hours.

(Part II of this article to be concluded in next month's (December 1949) issue of the Surgeon's Circular Letter)

PART III

STATISTICAL

HEALTH OF THE COMMAND



Admission rates per 1000 troops per annum for the five-week period ending 30 September 1949 were as follows:

	FEC	JAPAN	MARBO	PHILCOM	RYCOM
All Causes	599	635	275	448	642
Disease	548	583	208	384	604
Injury	51	51	68	64	38
Psychiatric	11	11	13	19	6.1
Common Respiratory Diseases and Flu	42	50	12	53	12
Primary Atypical Pneumonia	2.1	2.3	.81	6.2	0
Common Diarrhea	2.2	2.3	0	1.6	2.5
Bacillary Dysentery	.39	.09	0	4.7	1.0
Amebic Dysentery	.46	.17	0	4.7	1.0
Malaria, new	2.2	1.9	0	0	5.6
Infectious Hepatitis	6.3	4.3	.81	11	20
Mycotic Dermatoses	3.0	3.9	0	1.6	0
Rheumatic Fever	.13	.09	0	0	.51
Venereal Diseases	206	206	42	148	326

The admission rate for all causes for troops of this command shows a slight increase from 577 for August to 599 for September. This is the highest rate since April of this year; however, the health of the command is considered good and the slight increase in the disease component of the rate from 528 for the previous month to 548 for this month is to be expected at this season. The increase of 1 in the injury component of the admission rate is attributable to PHILCOM and RYCOM; Japan's rate decreased by 2.

The non-effective rate of 18 for September is an increase of 1 over the previous month, which was an all-time low for this command. The average non-effective rate for all overseas areas for May and June of this year was 19.2 and 19, respectively. On an average day in September, there were approximately 2,891 troops non-effective from disease and injury in the Far East Command.

DISEASES:

Common Respiratory Diseases and Flu: The rate for common respiratory diseases and flu increased from 40 for August to 42 for this month. This is favorable when considering the season of the year.

Malaria: The admission rate for total malaria decreased from 10 for the previous month to 5 for September. The only command not contributing to the decrease was RYCOM. The rate in that command remained low, however, at 5.6.

Diseases of the Central Nervous System: Subsequent to the submission of the report of the Health of the Command for August, several changes of diagnoses, pertaining to originally reported poliomyelitis cases, have occurred. The total number of cases of poliomyelitis for the month of August, as corrected, is 21. 19 cases have been clinically confirmed and reported for the month of September. To date, 25 October 1949, there have been 10 cases of Japanese B encephalitis, with laboratory confirmations, reported in the Far East Command for this year. Of these, 7 cases occurred in Japan and 3 in RYCOM. In addition, there is 1 suspected case in Japan.

Venereal Diseases: The total venereal diseases rate for this command increased from 185 for August to 206 for September. The Air Forces rate was 194 as compared to 210 for the Army. This constitutes a decreased rate among Air Force personnel from 197 for the previous month to 194, and an increased rate for Army from 182 to 210. The greatest increase occurred in Japan, rising from 178 in August to 206 for this month. The rate among white troops in Japan increased from 167 to 202 as compared to the decline among colored troops from 274 to 245.

NON-BATTLE INJURIES AND DEATHS: The rate for non-battle injuries increased 1 in September making a rate of 51 as compared to 50 for August. This is considered a good rate when compared to the average, which for the Far East Command for 1948 was 58. There were 36 deaths reported in the command for the month of September. Of the 36 deaths, 31 resulted from injuries and 5 from disease. Japan had 17 deaths from injuries and 4 from disease; MARBO had 12 from injuries and 1 from disease; RYCOM had 1 from injuries, none from disease; PHILCOM had 1 from injuries and none from disease.

Evacuation:

Tabulated below are the number of patients evacuated from the major commands to the ZI during the five report weeks in September and the number of patients awaiting evacuation as of 30 September 1949:

	BY AIR	BY WATER	TOTAL	PNTS AWAIT EVACUATION
JAPAN	53	250	303	67
MARBO	21	3	24	2
PHILCOM	22	3	25	18
RYCOM	3	78	81	19
FEC	99	334	433	106

Evacuations of military personnel per thousand strength for the period of 27 August to 30 September were as follows:

JAPAN	2.3	PHILCOM	3.1
MARBO	1.7	RYCOM	3.7
	FEC	2.6	

Hospitalization:

The bed status as of 30 September 1949 was as follows:

	Total T/O Beds Auth.	Total T/O Beds Establ.	Total T/O Beds Occupd.	% Auth. T/O Beds Occupd.	% of Establ. Beds Occupd.
JAPAN	4,600	4,338	1,819	40	42
MARBO	775	450	106	14	24
PHILCOM	1,250	1,250	756	60	60
RYCOM	750	443	268	36	60
FEC	7,375	6,481	2,949	40	46

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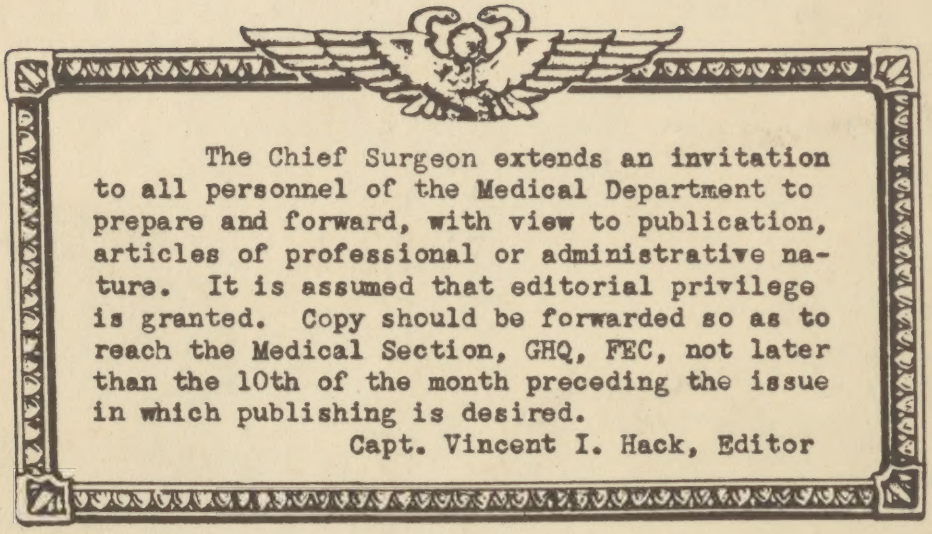

The Chief Surgeon extends an invitation to all personnel of the Medical Department to prepare and forward, with view to publication, articles of professional or administrative nature. It is assumed that editorial privilege is granted. Copy should be forwarded so as to reach the Medical Section, GHQ, FEC, not later than the 10th of the month preceding the issue in which publishing is desired.

Capt. Vincent I. Hack, Editor